

Claims

1. Static electricity eliminator intended in particular to improve the processing of polymers and comprising at least one injector having a body which defines a supersonic nozzle (14) for holding a compressed gas, a corona point (36) located close to the throat (40) of the nozzle and an electric supply circuit (32) connected to the corona point, characterised in that the corona point is formed by a surgical needle (36) composed of chromium-steel, whose point (38) has a diameter of less than 30 micrometres.
2. Eliminator according to claim 1, characterised in that the supersonic nozzle (14) is formed of a metal insert (42) comprising a hollow cylindrical part (56) extending forward by a conical part (58) ending with a flange (60) oriented inwards, the whole being moulded from an epoxy insulator (62) so as to cover with insulator the conical part (58) and its flange (60) both outside and inside, and the front of the inner cylindrical part.
3. Eliminator according to claim 2, characterised in that the hollow cylindrical part forming the metal insert (52) of the nozzle (14) is equipped at its rear part with a female thread (68) and has an outer wall (70) having the same diameter (D) as a cylindrical metal tube (12) which protects a front part of the injector and which is located adjacent to the metal insert.
4. Eliminator according to claim 3, characterised in that the needle (36) is supported by an insulating mantle (48) having a threaded front part (72) adapted to screw into the female thread (68) of the rear end of the metal insert (52) of the nozzle.
5. Eliminator according to claims 3 and 4, taken in combination, characterised in that it comprises a metal ring (50) contrived to slide with gentle friction over the rear part of the nozzle (14) and over the cylindrical metal tube (12) and to be

fixed thereon in a selected position so as to ensure conductive contact between the metal insert (52) of the nozzle and the metal tube.

6. Eliminator according to claim 4, characterised in that the insulating mantle (48) is equipped internally with a fixing device formed by two metal rings (76, 78) penetrated by apertures to allow the passage of the compressed gas, and one of which at least (78) is equipped with a thread.

7. Eliminator according to claim 6, characterised in that the needle (36) is carried by a threaded support (42) contrived to be screwed or unscrewed in the fixing device (76, 78) in order to effect approximate control of the position of the point (38) of the needle (36) relative to the throat (40) of the nozzle (14).

8. Eliminator according to claim 7, characterised in that the relative position of the point (38) of the needle (36) and the throat (40) of the nozzle (14) can be adjusted rapidly and with precision, without dismantling the injector, by screwing or unscrewing the nozzle (14) on the front threaded end (72) of the insulating mantle (48) defined in claim 4, which surrounds the needle support.

9. Eliminator according to one of claims 1 to 8, characterised in that the needle (36) comprises a conical recess (54) formed at a rear end located opposite the point (38).

10. Eliminator according to claim 9, characterised in that the rear end of the needle (36) is engaged inside a recess (86) in the form of a hollow cylinder formed at the front of a metal support (42) in the shape of a cylinder, this recess having a diameter larger by several hundredths of a millimetre than that of the needle, and in that the rear end of the needle is fixed in the cylindrical recess (86) by widening the walls of the conical recess (54) of the needle following crushing of these walls between the inner wall of the support and a ball (88) of a ball-point pen of appropriate diameter.

11. Eliminator according to one of claims 3 to 10, characterised in that it comprises a metal T-shaped connection (20) allowing the introduction of the compressed gas into the injector and interposed between the metal tube (12) protecting the front of the injector and another metal tube (26) protecting the rear of the injector so as to form a contact with the tubes (12, 26) to ensure the continuity of the conductive link between the front and rear of the injector.
12. Eliminator according to claim 11, characterised in that the metal tube (26) protecting the rear of the injector is in contact with a metal fixing device (28) intended to anchor a coaxial cable (30) for supplying a high voltage to the needle, this metal fixing device being in contact itself with a metal casing of this cable which is connected to earth.
13. Eliminator according to one of claims 1 to 12, characterised in that the electricity supply circuit (32) of the corona needle (36) comprises two components in series between the needle (36) and the secondary of a transformer (128) which supplies thereto the high voltage, notably a capacitor (46) of a value of between 20 pF and 200 pF, and a resistor (44) of a value of between 1 M Ω and 100 M Ω .
14. Eliminator according to claim 13, characterised in that the capacitor (46) and the resistor (44) are located in an insulating envelope (92, 90) comprising apertures (94, 96) formed for the passage of input and output connections which are covered with a thermosetting insulating polymer in order to prevent the penetration of damp air into the envelope.
15. Eliminator according to one of claims 12 to 14, characterised in that the coaxial cable (30) supplying the high voltage ends on the side of an electrical supply circuit (32) with a high-voltage plug (100), passes through the central aperture (107) of a revolving metal part (108) known as the "cap", which has a flat side (110) located opposite the high-voltage device, with a milled recess (116) adapted for mounting a toric joint (118) about this central aperture (107),

this revolving part (108) having an outer diameter which is larger than that of the high-voltage plug (100), whereas the central aperture (107) has a diameter smaller than that of this plug.

16. Eliminator according to claim 15, characterised in that it comprises a conduit composed of impermeable plastics material (104) disposed about the coaxial cable (30) supplying the high voltage to the injectors, the sealing-tightness being supplemented by the mounting of two stuffing boxes (106, 120), one of which is placed about the input of the cable (30) into the injector and the other of which is placed at the input of the revolving part (108).

17. Eliminator according to claims 15 and 16, taken in combination, characterised in that the revolving part (108) has a threaded cylindrical extension (122) on the side oriented towards the supply device, this extension projecting via an aperture (124) of diameter greater than that of the high-voltage plug (100) into a cabinet (114) enclosing the electricity supply, the toric joint (118) being applied in a sealing-tight manner to an outer wall (112) of this cabinet by screwing a threaded ring (126) on to this threaded extension (122).

18. Eliminator according to one of claims 1 to 17, characterised in that the electricity supply circuit of the injector(s) has high-voltage transformers (128), whose primary winding is connected to the output of a synchronous static relay (130) supplied by an alternating voltage source, e.g. by the mains.

19. Eliminator according to claim 18, characterised in that the application of the primary voltage to the static relay (130) is controlled by a time-delayed relay (132) whose coil is supplied from a pressure-sensitive switch (134) connected to the distribution network of compressed gas (24) supplied to the injector(s).

20. Eliminator according to claim 19, characterised in that the injector(s) is/are supplied with compressed air at a pressure of between 12 and 5 bars, at a dew point of between -19°C and -40°C.

21. Eliminator according to one of claims 1 to 20, characterised in that it comprises an even number of injectors, each group of two injectors being formed of injectors having voltage-current properties which are as similar as possible, each of the two injectors being connected to an opposite polarity of an alternating supply.

22. Eliminator according to claim 21, characterised in that, for each group of two injectors, the primary winding (140A) of the high-voltage transformer supplying a first injector (10A) and the primary winding (140B) of the high-voltage transformer supplying a second injector (10B) are in phase opposition.